

## RenAM 500 series additive manufacturing systems



RenAM 500S Flex | RenAM 500S | RenAM 500S Ultra

RenAM 500D Flex | RenAM 500D | RenAM 500D Ultra

RenAM 500Q Flex | RenAM 500Q | RenAM 500Q Ultra



## **System description**

The RenAM 500 series is Renishaw's range of high-productivity laser powder bed fusion (LPBF) additive manufacturing (AM) systems. All versions of the RenAM 500 series feature a digital control system and a vacuum chamber for quickly preparing low-oxygen build atmospheres. The RenAM 500 series can be configured with one (500S), two (500D) or four (500Q) high-power 500 W lasers, each able to access the whole powder bed surface.

The RenAM 500 and RenAM 500 Ultra systems feature automated powder and waste handling systems that automatically sieve and cycle powder back into the machine without user intervention. The RenAM 500 Flex systems feature a total loss powder management system designed for external sieving, which allows for greater flexibility when it comes to powder choice.

RenAM 500 Ultra systems come equipped with additional features designed to maximise laser-on time during a build, allowing for even faster production rates. As standard, RenAM 500 Ultra systems have Renishaw's TEMPUS™ technology installed – an innovation that synchronises the lasers with the powder recoater to reduce build times by up to 50%.

Renishaw's latest process monitoring tools are also included as standard for RenAM 500 Ultra systems. These tools provide live feedback on powder dosing, laser energy input and melt-pool characteristics, which can be analysed to monitor build quality and reduce post-build inspection costs. The process monitoring tools packaged with RenAM 500 Ultra systems include:

- · LaserVIEW hardware module
- MeltVIEW hardware module
- CameraVIEW hardware module
- 12-month licence for InfiniAM Camera software
- · 12-month licence for InfiniAM Spectral software
- · Renishaw Central AM connector.

Model configurations						
Model	Number of lasers	Powder recirculation	CameraVIEW	LaserVIEW and MeltVIEW	TEMPUS technology	RBV and OSV compatible **
RenAM 500S Flex	1	*	✓	*	*	✓
RenAM 500S	1	✓	✓	*	*	✓
RenAM 500S Ultra	1	✓	✓	✓	✓	✓
RenAM 500D Flex	2	*	✓	*	*	✓
RenAM 500D	2	✓	✓	*	*	✓
RenAM 500D Ultra	2	✓	✓	✓	✓	✓
RenAM 500Q Flex	4	*	✓	*	*	✓
RenAM 500Q	4	✓	✓	*	*	✓
RenAM 500Q Ultra	4	✓	✓	✓	✓	✓

<sup>\*</sup> Model can be upgraded to support this technology post-purchase.

## Safety certifications









The Reduced Build Volume (RBV) and Optical System Verification (OSV) kits are optional ancillaries designed for the RenAM 500 series systems that enhance thier capabilities. Contact Renishaw for further information.



Processable materials         Metals in powder form. Examples include stainless and coll steels. aluminium allolys. Rother based allolys and titanium alloys. Por further material information and surface finishes, vist* www.renishaw.com/msds For further material information and surface finishes, vist* www.renishaw.com/msds For further material information and surface finishes, vist* www.renishaw.com/msds For further material information and surface finishes, vist* www.renishaw.com/msds For further material information and surface finishes, vist* www.renishaw.com/msds For further material information and surface finishes, vist* www.renishaw.com/msds For further material information and surface finishes, vist* www.renishaw.com/msds For further with all surface finishes. Vist with the further products of the product of the pr	Specifications						
Near	Processable materials		• • • • • • • • • • • • • • • • • • • •				
Mass (net)         RenAM 500 Flox 1 (370 kg (4.122 lb) 1 (1900 kg (4.189 lb) 1 (1900 kg (4.321 lb) 1 (1900 kg (4.348 lb) 1 (1900 kg (4.148 lb)							
RenAM 500 Files	Mass (not)			1	1		
RenAM 500   1,950 kg (4,300 lb)   1,980 kg (4,365 lb)   2,070 kg (4,448 lb)     RenAM 500 Ultra   1,970 kg (4,343 lb)   2,010 kg (4,416 lb)   2,770 kg (4,564 lb)     RenAM 500 Flex   2,165 mm (86 in)   1,236 mm (49 in)   2,794 mm (110 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,265 mm (19 in)     RenAM 500 Ultra   2,165 mm (86 in)   2,260 mm (98 in × 9.8 in × 13.8 in ×	Mass (Het)	PonAM 500 Flox	`	,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
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Dimensions         RenAM 500 Flex RenAM 500 Flex 2,165 mm (86 in) 1,236 mm (49 in) 2,794 mm (110 in) 2,794 mm (110 in) 2,165 mm (86 in) 1,236 mm (49 in) 2,130 mm (84 in) 3,130				, ,			
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RenAM 500   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)     Caser properties   S (single laser)   D (dual laser)   D (quad laser)     Caser properties   Laser power   71yeo flaser   71y	Zimonorono	RenAM 500 Flex	-	-			
RenAM 500 Ultra   2,165 mm (86 in)   1,236 mm (49 in)   2,130 mm (84 in)			, ,	,			
Laser properties         Laser power         1 x 500 W         2 x 500 W         4 x 500 W           Build volume¹         250 mm x 250 mm x 350 mm (9.8 in x 9.8 in x 13.8 in)           Powder layer thickness         20 µm to 120 µm         3 0 µm to 120 µm           Build rate²         20 µm to 120 µm         1 m s (9.8 in x 9.8 in x 13.8 in)           Build rate²         20 µm to 120 µm         3 0 µm to 100 µm           Beam focus diameter         80 µm (3 x 10³ in) with dynamic focus           Dynamic focus diameter         1,070 nm to 1,080 nm           Laser modulation frequency (maximum)         20 kHz           Time to prepare build chamber atmosphere         15 minutes (to < 1,000 ppm oxygen)           System fill/purge consumption (during fill)         < 1,200 L (43 ft²)           Maximum argon consumption (during fill)         < 0.8 L/min (1.8 ft²m)           Working pressure in chamber         10 mbar-gauge to 20 mbar-gauge           Argon gas supply connection         3/8 in BSP male cone fitting           Argon quality         20 ppm permissable impurities or better (99.998% pure)           Power supply⁴         380 V to 480 V AC, 63 A, 50 Hz to 60 Hz, 3-phase           Data connections⁵         Standard network connection RJ45. Renishaw recommends using Cat6 cabling.           Chilled water connection ⁵         Standard network connection RJ45. Renishaw recomme			, ,	,	, ,		
Laser power   Type of laser   Ytterbium fibre	Laser properties	. 1013 111 000 01114	, ,	, ,	· · · · · · · · · · · · · · · · · · ·		
Type of laser   Ytterbium fibre   Ytterbium fibre		Laser power	, ,	,	· · · /		
Build volume ¹ 250 mm × 250 mm × 350 mm (9.8 in × 9.8 in × 13.8 in)  Powder layer thickness 20 μm to 120 μm  Build rate ² Up to 254 cm³/h (15.5 in³/h)  Typical processing speed ³ 2 m/s (6.6 ft/s) (maximum 10 m/s (32.8 ft/s))  Beam focus diameter 80 μm (3 × 10 ³ in) with dynamic focus  Dynamic focus diameter Up to 500 μm (20 × 10 ³ in)  Beam wavelength 1,070 nm to 1,080 nm  Laser modulation frequency (maximum) 20 kHz  Time to prepare build chamber atmosphere 15 minutes (to < 1,000 ppm oxygen)  System fill/purge consumption (during fill) 400 L/min (14.12 ft³/min)  Running argon consumption (after initial fill) < 0.8 L/min (1.8 ft³/h)  Working pressure in chamber 10 mbar-gauge to 20 mbar-gauge  Argon gas supply connection 3/8 in BSP male cone fitting  Argon quality 20 ppm permissable impurities or better (99.998% pure)  Power supply ⁴ 380 V to 480 V AC, 63 A, 50 Hz to 60 Hz, 3-phase  Data connections ⁵ Standard network connection RJ45. Renishaw recommends using Cat6 cabling.  Chilled water connection 6 Connection hose is 19 mm (internal diameter) and 26 mm (external diameter). Compatible with water-air and water-water chillers, available from Renishaw.  Ideal operating temperature 7 18 °C to 22 °C (64 °F to 72 °F) Minimum/maximum: 15 °C to 28 °C (60 °F to 82 °F)  Ideal relative humidity 7 < 60% (maximum < 80%)  Clearance under machine (no plinth) 148 mm (5.75 in)  Noise level  ≤ 70 dB  Compatible software		•					
Powder layer thickness         20 μm to 120 μm           Build rate ²         Up to 254 cm³/h (15.5 in³/h)           Typical processing speed ³         2 m/s (6.6 ft/s) (maximum 10 m/s (32.8 ft/s))           Beam focus diameter         80 μm (3 x 10³ in) with dynamic focus           Dynamic focus diameter         Up to 500 μm (20 x 10³ in)           Beam wavelength         1,070 nm to 1,080 nm           Laser modulation frequency (maximum)         20 kHz           Time to prepare build chamber atmosphere         15 minutes (to < 1,000 ppm oxygen)           System fill/purge consumption         < 1,200 L (43 ft²)           Maximum argon consumption (during fill)         400 L/min (14.12 ft²/min)           Running argon consumption (after initial fill)         < 0.8 L/min (1.8 ft²/h)           Working pressure in chamber         10 mbar-gauge to 20 mbar-gauge           Argon gas supply connection         3/8 in BSP male cone fitting           Argon quality         20 ppm permissable impurities or better (99.998% pure)           Power supply ⁴         380 V to 480 V AC, 63 A, 50 Hz to 60 Hz, 3-phase           Data connections ⁵         Standard network connection RJ45. Renishaw recommends using Cat6 cabling.           Chilled water connection ⁵         Connection hose is 19 mm (internal diameter) and 26 mm (external diameter). Compatible with water-air and water-water chillers, available from Renishaw.	21						
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Time to prepare build chamber atmosphere  System fill/purge consumption  Aximum argon consumption (during fill)  Maximum argon consumption (during fill)  Working pressure in chamber  Argon gas supply connection  Argon quality  Power supply 4  380 V to 480 V AC, 63 A, 50 Hz to 60 Hz, 3-phase  Data connections 5  Standard network connection RJ45. Renishaw recommends using Cat6 cabling.  Connection hose is 19 mm (internal diameter) and 26 mm (external diameter). Compatible with water-air and water-water chillers, available from Renishaw.  Ideal operating temperature 7  It 8 °C to 22 °C (64 °F to 72 °F)  Minimum/maximum: 15 °C to 28 °C (60 °F to 82 °F)  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 7  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 8  Compatible with water-air and water-water chillers available from Renishaw.  Ideal relative humidity 8  Compatib			1,070 nm to 1,080 nm				
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Power supply 4       380 V to 480 V AC, 63 A, 50 Hz to 60 Hz, 3-phase         Data connections 5       Standard network connection RJ45. Renishaw recommends using Cat6 cabling.         Chilled water connection 6       Connection hose is 19 mm (internal diameter) and 26 mm (external diameter). Compatible with water-air and water-water chillers, available from Renishaw.         Ideal operating temperature 7       18 °C to 22 °C (64 °F to 72 °F) Minimum/maximum: 15 °C to 28 °C (60 °F to 82 °F)         Ideal relative humidity 7       < 60% (maximum < 80%)         Clearance under machine (no plinth)       146 mm (5.75 in)         Optical module sealing       IP5X         Noise level       ≤ 70 dB         Compatible software       QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select	• • • • • • • • • • • • • • • • • • • •		3/8 in BSP male cone fitting				
Data connections ⁵       Standard network connection RJ45. Renishaw recommends using Cat6 cabling.         Chilled water connection ⁶       Connection hose is 19 mm (internal diameter) and 26 mm (external diameter). Compatible with water-air and water-water chillers, available from Renishaw.         Ideal operating temperature ⁻       18 °C to 22 °C (64 °F to 72 °F) Minimum/maximum: 15 °C to 28 °C (60 °F to 82 °F)         Ideal relative humidity ⁻       < 60% (maximum < 80%)	0 0 11 7		20 ppm permissable impurities or better (99.998% pure)				
Chilled water connection <sup>6</sup> Connection hose is 19 mm (internal diameter) and 26 mm (external diameter). Compatible with water-air and water-water chillers, available from Renishaw.  Ideal operating temperature <sup>7</sup> 18 °C to 22 °C (64 °F to 72 °F) Minimum/maximum: 15 °C to 28 °C (60 °F to 82 °F)  Ideal relative humidity <sup>7</sup> < 60% (maximum < 80%)  Clearance under machine (no plinth) 146 mm (5.75 in)  Optical module sealing IP5X  Noise level ≤ 70 dB  Compatible software QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select	<u> </u>		380 V to 480 V AC, 63 A, 50 Hz to 60 Hz, 3-phase				
Compatible with water-air and water-water chillers, available from Renishaw.  18 °C to 22 °C (64 °F to 72 °F) Minimum/maximum: 15 °C to 28 °C (60 °F to 82 °F)  Ideal relative humidity <sup>7</sup> < 60% (maximum < 80%)  Clearance under machine (no plinth) 146 mm (5.75 in)  Optical module sealing IP5X  Noise level ≤ 70 dB  Compatible software QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select			Standard network connection RJ45. Renishaw recommends using Cat6 cabling.				
Ideal operating temperature 7       18 °C to 22 °C (64 °F to 72 °F)         Minimum/maximum: 15 °C to 28 °C (60 °F to 82 °F)         Ideal relative humidity 7       < 60% (maximum < 80%)         Clearance under machine (no plinth)       146 mm (5.75 in)         Optical module sealing       IP5X         Noise level       ≤ 70 dB         Compatible software       QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select	Chilled water connecti	ion <sup>6</sup>	Connection hose is 19 mm (internal diameter) and 26 mm (external diameter).				
Minimum/maximum: 15 °C to 28 °C (60 °F to 82 °F)         Ideal relative humidity 7       < 60% (maximum < 80%)         Clearance under machine (no plinth)       146 mm (5.75 in)         Optical module sealing       IP5X         Noise level       ≤ 70 dB         Compatible software       QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select			Compatible with water-air and water-water chillers, available from Renishaw.				
Ideal relative humidity 7       < 60% (maximum < 80%)         Clearance under machine (no plinth)       146 mm (5.75 in)         Optical module sealing       IP5X         Noise level       ≤ 70 dB         Compatible software       QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select	Ideal operating temperature 7		· · · · · · · · · · · · · · · · · · ·				
Clearance under machine (no plinth)       146 mm (5.75 in)         Optical module sealing       IP5X         Noise level       ≤ 70 dB         Compatible software       QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select							
Optical module sealing     IP5X       Noise level     ≤ 70 dB       Compatible software     QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select	•						
Noise level       ≤ 70 dB         Compatible software       QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select	· · · ·						
Compatible software QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select	<u> </u>						
tilliu-party providers	Compatible software		QuantAM, InfiniAM Camera, InfiniAM Spectral, Renishaw Central and select third-party providers				

Build volume refers to the maximum wall-to-wall build volume, but builds will typically be smaller. Dimensions do not include build plate.

<sup>&</sup>lt;sup>2</sup> Maximum build rate does not include recoater time and is dependent upon parameters, part geometry and material.

Typical processing speed is dependent upon parameters, part geometry and material.

<sup>&</sup>lt;sup>4</sup> Maximum calculated load of machine is 50 A, nominal operating current is 32 A.

<sup>&</sup>lt;sup>5</sup> The user has the option to configure the network using their own control software. Refer to the *RenAM 500 series additive manufacturing system* user guide, Renishaw part no. H-5800-3693, for more information.

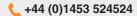
Due to differences in electrical requirements across countries, the part numbers of ancillary equipment may vary. Consult your local service department if you have questions in this regard.

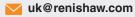
Temperature and humidity must not be at their stated maximum at the same time, and must remain below the level where the dew point approaches 16 °C (61 °F) to avoid condensation forming on the laser components. Refer to the RenAM 500 series additive manufacturing system Site preparation and Installation guide, Renishaw part no. H-5800-3692.



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